UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/666,412	09/18/2003	Joseph Wang	37000-UT-0206	8931

5179 7590 09/21/2005

PEACOCK MYERS, P.C.
P O BOX 26927
ALBUQUERQUE, NM 87125-6927

EXAMINER	
DO, PENSEE T	

ART UNIT	PAPER NUMBER
1641	

DATE MAILED: 09/21/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/666,412	WANG ET AL.	
	Examiner	Art Unit	
	Pensee T. Do	1641	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 July 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-40* is/are pending in the application.

4a) Of the above claim(s) *33-40* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-32* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☒ Claim(s) *1-32* are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

Applicant's election with traverse of group I, claims 1-32 in the reply filed on July 1, 2005 is acknowledged. The traversal is on the ground(s) that the process cannot be practiced with another materially different product such as colorimetric particles or solid phase incorporated with a fluorescent dye since the signal from those other products is not distinguishable one from the other if the sample contains a heterogeneous population of colorimetric particles or fluorescent dyes. This is not found persuasive because dyes can be combined to produce a specific signal such as those in a fiber. Several dyes can be combined at a specific ratio to produce a unique signal.

The requirement is still deemed proper and is therefore made FINAL.

Amendment Entry & Claim Status

The amendment filed on July 1, 2005 has been acknowledged and entered.

Claims 1-32 are examined.

Claims 33-40 are withdrawn from further consideration.

Withdrawn Rejection(s)

Rejection under USC 112, 2nd paragraph is withdrawn herein.

Double patenting rejection is withdrawn herein due to a filed Terminal Disclaimer.

Rejections under 102 by Durst and Lu are withdrawn due to the amendment.

New Grounds of Rejection

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-4, 6-7, 10-13, 16-19 are rejected under 35 U.S.C. 102(b) as being anticipated by Brooks et al. (US 5,753,517).

Brooks teaches a quantitative immunochromatographic assay for measuring the amount of an analyte and an apparatus for use in the assay. The method comprises providing a microsphere having an incorporated electroactive marker and a first member of a specific binding pair attached to the microsphere wherein the microsphere is not a liposome. The microsphere can be colloidal gold, sulphur, selenium, barium sulfate, iron sulfate, metal iodate, silver halide, silica particle or organic polymer latex particles. The particles are polystyrene latex beads. These polymeric microspheres are insoluble in an aqueous solution. The particles are labeled with electroactive agents such as ferrocyanite to facilitate detection. The particles are coated with a agent that specifically binds to the analyte. (see col. 4, line 60-col. 5, line 33). The second member of the binding pair is bound to a substrate (see col. 6, lines 50-64). The analyte is incubated with the microsphere. (see col. 4, lines 24-47). The specific binding pair complex is an antigen/antibody. (see col. 3, lines 58-67). The method further comprises releasing the electroactive marker from the microsphere by solubilizing the microsphere. Electrochemical testing comprises measurement of one or more electrical quantities in

relationship to one or more chemical parameters such as current, potential or charge by anodic stripping voltametry. (see col. 7, lines 15-19).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 25, 26, 31 and 32 arerejected under 35 U.S.C. 103(a) as being unpatentable over Bamdad et al. (US 2003/0059955) in view of Brooks et al. (US 5,753,517).

Bamdad teaches a method of detection of the presence of a member of a specific binding pair, the method comprising: providing semiconductor nanocrystal (nanoparticle or redox-active molecules such as ferrocene derivatives (metallocene)) embedded within or attached to a microparticle such as a colloidal particle. Colloidal particles include self-suspendable/insoluble particles including organic, polymeric, and metal particles. The polymeric particle/microsphere can be polystyrene. (see [0034]; selecting for the microsphere by formation of a specific binding pair complex and electrochemically testing for the electroactive marker/nanocrystal. The first member of a specific binding pair is attached to the microsphere/particle through covalent bond and a functional group. The first member of a specific binding pair is attached to the microsphere and a second member of the specific binding pair attaches to a substrate such as a magnetic bead. Binding partners can be two different types of antibodies,

proteins, enzyme/substrate, antibody/antigen, antibody/hapten, carrier protein/substrate, receptor/hormone, etc. (see ([0048]; [0031]; [0034]; [0058]; [0063]; [0074] lines 1-13; [0073]). Regarding claim 20, Bamdad teaches providing a second nanoparticle different from the first nanoparticle, attaching the second binding pair member specific to the second analyte to the second microsphere/nanoparticle; incubating the first microsphere and the second microsphere in a solution comprising the sample; selecting the first and second microspheres by formation of specific binding pair complexes; and electrochemically testing the first electroactive marker and the second electroactive marker.([0013], [0073]; example 4 [0080], [0081]).

However, Bamdad fails to teach releasing the first electroactive marker and the second electroactive marker from the first and second microspheres respectively; and the electrical quantities comprise current, potential or charge by using chronopotentiometric detection, stripping potentiometry or chronopotentiometry, anodic or cathodic stripping voltametry or adsorptive stripping voltametry.

Brooks has been discussed above.

It is well known that when using electroactive agent as a label, such electroactive agent must be released in order to quantitate the analyte associated with it. (see Brooks). Since Bamdad also teaches using electroactive agent embedded within a microsphere, it would have been obvious to one of ordinary skills in the art to release such electroactive agent at detection as taught by Brooks in the method of Bamdad. Detection of electroactive agent is usually carried out by anodic stripping voltametry as taught by Brooks. Thus, it would have been obvious to one of ordinary skills in the art to

detect by anodic stripping voltametry as taught by Brooks for electrochemical analysis as taught by Bamdad since Bamdad teaches detection of the electroactive agent by electrochemical analysis.

Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bamdad (US 2003/0059955) in view of Barbera-Guillem et al. (US 6,680,211).

Bamdad has been discussed above.

However, Bamdad fails to teach incubation of a polymeric microsphere in an organic solvent including an electroactive marker.

Barbera-Guillem teaches polymeric microspheres incubated with an organic solvent comprising fluorescent nanocrystals (electroactive agent). In this organic solvent, the polymeric microspheres are swelled to entrap the fluorescent nanocrystals. (see col. 11, lines 23-55).

It is well known that in order for a polymeric microsphere to entrap an indicator compound, such microsphere must be placed in an organic solvent so that the polymeric microsphere swells up and entrap the indicator compound or whatever it is needed to be entrapped. It would have been obvious to one of ordinary skills in the art to incubate the polymeric microspheres and nanocrystals of Bamdad in an organic solvent to facilitate entrapment of the nanocrystals in the polymeric microspheres since Bamdad teaches nanocrystals are entrapped in polymeric microspheres.

Maintained Rejection(s)

Claim Rejections - 35 USC § 102

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the

applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-4, 6-11, 14-17, 20-24, 27-30 are rejected under 35 U.S.C. 102(e) as being anticipated by Bamdad (US 2003/0059955).

Bamdad teaches a method of detection of the presence of a member of a specific binding pair, the method comprising: providing semiconductor nanocrystal (nanoparticle or redox-active molecules such as ferrocene derivatives (metallocene)) embedded within or attached to a microparticle such as a colloidal particle. Colloidal particles include self-suspendable/insoluble particles including organic, polymeric, and metal particles. The polymeric particle/microsphere can be polystyrene. (see [0034]; selecting for the microsphere by formation of a specific binding pair complex and electrochemically testing for the electroactive marker/nanocrystal. The first member of a specific binding pair is attached to the microsphere/particle through covalent bond and a functional group. The first member of a specific binding pair is attached to the microsphere and a second member of the specific binding pair attaches to a substrate such as a magnetic bead. Binding partners can be two different types of antibodies, proteins, enzyme/substrate, antibody/antigen, antibody/hapten, carrier protein/substrate, receptor/hormone, etc. (see ([0048]; [0031]; [0034]; [0058]; [0063]; [0074] lines 1-13; [0073]). Regarding claim 20, Bamdad teaches providing a second nanoparticle different from the first nanoparticle, attaching the second binding pair member specific to the second analyte to the second microsphere/nanoparticle; incubating the first microsphere and the second microsphere in a solution comprising the sample; selecting the first and

second microspheres by formation of specific binding pair complexes; and electrochemically testing the first electroactive marker and the second electroactive marker.([0013], [0073]; example 4 [0080], [0081]).

> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

Claims 1, 2, 4, 7, 10-12, 17, 18 are rejected under 35 U.S.C. 102(e) as being anticipated by Knoll (US 6,548,311).

Knoll teaches a sandwich assay format comprising a microelectrode on which capture antibodies that bind to the analytes are immobilized; antigens (analyte) and marker particles charged with an electroactive material and conjugated with an antibody that binds to the analyte are added to the electrode to form complex of electrode-capture antibody-analyte-antibody-marker particles (Electroactive material); electrochemically testing for the electroactive marker by measuring the voltage. The particles are microspheres of SiO2, latex, diamagnetic, paramagnetic and other materials having diameters between 15 nm and 25 nm. The electroactive material may emerge from the particle from the particle surface by diffusion. The binding pair complex

is antigen/antibody; enzyme/substrate; DNA/RNA (fig. 20 (e) and col. 13, line 65-col. 14, line 41; fig. 17).

Response to Arguments

Applicant's arguments filed July 1, 2005 have been fully considered but they are not persuasive.

Regarding the Bamdad reference, Applicants argue that Bamdad uses an art conventional method for detection, and in no way teaches detection of the nanoparticle itself by electrochemical detection. Applicants also argue that Bamdad fails to teach "electrochemical detection" as defined in the specification as that "includes the measurement of electrical quantities such as potential, current, or charge.

Applicants' attention is directed to Bamdad, col. 5, [0049] where Bamdad defines that determining refers to quantitative or qualitative analysis of a species via spectroscopy, ellipsometry, piezoelectric measurement, ***electrochemical measurement***, etc. and col. 9, [0083] where Bamdad teaches that "Electrode may detect electrical properties of the complexes, or may detect emission spectra or other physical or chemical characteristics of the complexes". The present specification also teaches, as submitted by Applicants in the response, page 10, 2nd paragraph, that "electrodes, methods of detection and analysis are generally disclosed in Analytical Electrochemistry".

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., electrochemical detection means measurement of current, potential or charge,

stripping voltammetry etc.) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). The claim recites that "detecting the specific binding pair complex by electrochemical testing the electroactive marker". It fails to recite specifically that electrochemical detection means the measurement of one or more electrical quantities such as current, potential, or charge in relationship to one or more chemical parameters.

Regarding the Knoll reference, Applicants argue that Knoll does not teach a microsphere with an electroactive marker associated therewith to induce a characteristic electrical fingerprint that is unique to each electroactive marker and that Knoll does not teach detecting the specific binding pair complex by electrochemical testing for the electroactive marker.

Applicants' attention is directed to Knoll, col. 14, lines 29-30, where Knoll teaches that "marker particles 5 are charged with the electroactive material A". Clearly, Knoll teaches that the marker particles are associated with an electroactive marker. Applicants summarizes that "Knoll teaches a detection method that is purely electrical in nature... The signal is dependent upon bound marker particles which disturb or change the electrical resistance between a first electrode and a counter electrode". The specification defines that "electrochemical detection includes measurement of one or more electrical quantities such as current, charge, or potential". Thus, since Knoll

measures a voltage in order to detect the bound marker particles, which are charged with an electroactive material, it meets the requirement of the present invention.

This office action is still non-final because original claims 16 and 28 are rejected by Bamdad for the first time.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Pensee T. Do whose telephone number is 571-272-0819. The examiner can normally be reached on Monday-Friday, 7:00-3:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Long Le can be reached on 571-272-0823. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Pensee T. Do
Patent Examiner
September 15, 2005

LONG V. LE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1600
09/19/05